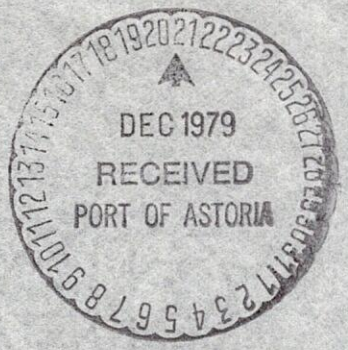
United States Navigation (Pacific), Inc.

200 S.W. Market • Portland, Oregon 97201 • (503) 224-8230



December 18, 1979

Mr. G. Grove, General Manager
Port of Astoria
P. O. Box 569
Astoria, OR 97103

Dear George:

The attached data covering Clausen Steamship may be of interest.

I've also attached additional background covering some exchanges with Clausen's office in Washington D. C. Hope you were able to view the cattle boat at Vancouver, Washington, and that you may see fit to travel to Richmond, VA to look at that facility. I've written Bent Bloch in Sydney per attached which will bring you current in a number of areas.

You should now have received the frozen studies which I have also sent to Ken Meier.

Look forward to seeing you after the first. Best regards and thanks for taking the time to speak with us while in Astoria.

Yours very truly,

R. C. Cornelius

Enclosures

United States Navigation (Pacific), Inc.

200 S.W. Market • Portland, Oregon 97201 • (503) 224-8230

December 19, 1979

Mr. B. Bloch, Director & General Manager
Clausen Steamship Co. (Australia) Pty Ltd
Gold Fields House, 1-Alfred St.
Sydney, N. S. W. 2000

Dear Bent:

A short note to bring you current on a recent trip to Astoria, and a conversation between myself, George Grove, their General Manager, and Ken Meier (Oregon D. O. A.).

George Grove is ready, has the land and more than one building on the waterfront. We gave him the basics, and suggested that he visit the Richmond, Virginia Port Authority to have a first hand look at the number one in the U. S. I believe he will do this right after the first of the year, and in fact is in Portland this week looking at the Livestock Express vessel Brent Fisher has loading at Vancouver, Washington (across the river from Portland but using the Portland quarentine station) on December 19. I wonder if/when he goes to Richmond. whether a call on Claude Dobbins would be in order? If so, let me know by cable. In summary, I think after meeting with George, we have a small port with good labor (with whom we also met), the proper facilities, and an interest to bring in what is required of the USDOA for the quarentine station. We have a good road to Astoria, and most importantly to an owner, a savings of about 16 or more hours not steaming upriver. I've attached some preliminary data covering Astoria. The next step will be to look at Richmond, contact the USDOA, and then get some sort of committment from an exporter (Fisher?) to move the cattle through that facility.

In that connection I spoke today with Scott Hutchinson, the son of Jim Hutchinson. Scott advises his father is in Japan today, Taiwan next week, and home just prior to Christmas. We will all meet subsequent to his return, advising you where we are in connection with their position as the "new exporter."

I also spoke to Verne Chase today. He hasn't really moved since I last reported. The deal we worked on together and reported in mine of December 9 to you still has not come together, and Verne is now fending off the USDOA by saying the Port are now working toward a watersite facility somewhere down near Terminal Six in their Rivergate complex. No details and how long he can hold the DOA on the string, but if Astoria is able to move quickly, the pressure will certainly be on.

More later after we've talked again to the Hutchinson group and with George Grove.

Yours very truly,

R. C. Cornelius

Enclosures

THE PORT OF ASTORIA

At the entrance to the mighty Columbia River

P. O. BOX 569 ASTORIA, OREGON 97103 PHONE (503)325-4521

COMMISSIONERS:
HENRY C. DESLER, PRESIDENT
DAVID D. CORKILL, VICE-PRESIDENT
HOWARD B. JOHNSON, SECRETARY
FRED C. SHAYLOR, TREASURER
CHARLES J. THOMPSON, ASST. TREASURER
GEORGE R. GROVE, EXECUTIVE DIRECTOR

May 8, 1980

Mr. Wayne Halvorson
Trade West
122 S.W. 3rd Avenue
Portland, Oregon 97207

Dear Wayne:

Enclosed are brochures of the Port and location maps of the Port of Astoria indicating the location of Pier 1 as well as Port and Harbor information which describes Pier 1 including the amount of square footage and other information about the Pier. If we handle hay cubes in bulk, it would be over Pier 1.

The shed was constructed in 1918 and is maintained in good condition, as well as being sprinklered. The commodities handled in the Pier shed have been plywood, flour and similar commodities. No cargos of contaminated matter have been stored in the shed so there would be no danger of the hay cubes absorbing any deleterious ordors.

We hope you will be successful in playing a role in the export of cubes, and in that respect, we will work closely with you to provide rates which are conducive of attracting the cargo through our port facility. Please keep me advised of your progress.

Yours sincerely,

George

George R. Grove
Executive Director

GRG:sd
Enclosures

Columbia River Tops U.S. Inland Waterway Box Traffic

By Bruce Johnson
Container News
West Coast Bureau

CONTAINER barging on the Columbia River of the U.S. Pacific Northwest is barging into markets previously held by the trucking and railroad industries as a result of the lower-cost advantage of the waterborne over land modes.

It was only five years ago that container barging was launched between upriver points and the Port of Portland, the river's primary ocean-carrier outlet.

But container-shipper acceptance of the container-barging concept has been so overwhelming that today an average of 1,100 actual containers (not TEUs) moves monthly to and from Portland. That compares with 60 containers per month at the outset of service.

Top Box System

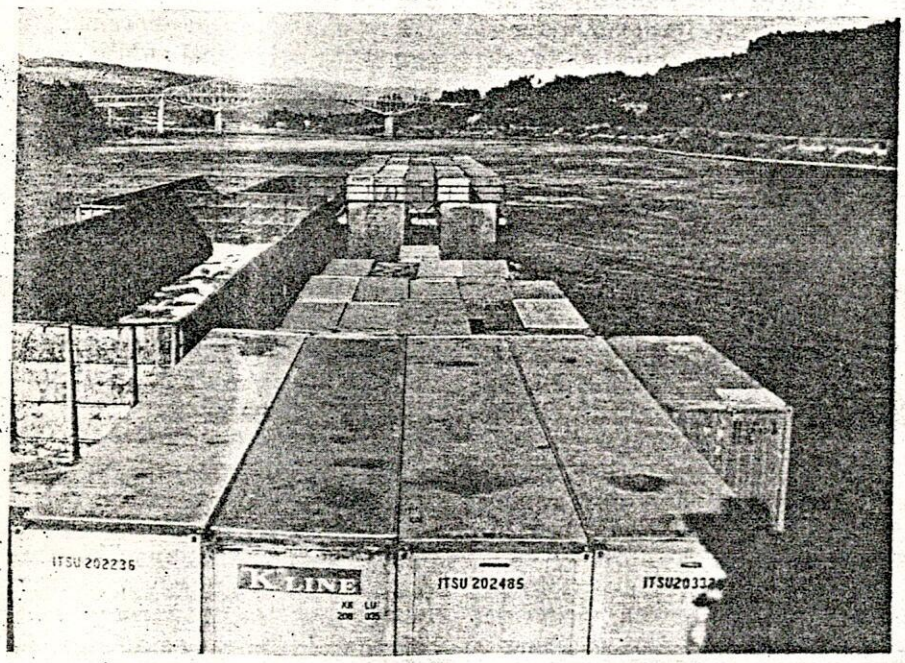
Growth in the container-barging business has been nothing short of spectacular. In 1976, the first full year of container barging, 6,330 TEUs moved on the river. In 1977, the figure was 8,419, and in 1978, 14,411. Last year, 19,918 TEUs were barged on the river.

In five short years, the Columbia River system has become the country's leading inland-water highway for containerized cargoes, in terms of container-hauling volume. Truck and rail modes have been left rocking in the tug-and-barge wakes.

"We like to believe that anything within 75 miles of an upriver port is beneficial to go by barge as opposed to truck or rail," said Louis D'Amico, the Port of Portland's western U.S. sales manager.

$100 Cost Saving

Within that distance, the overall average cost savings per container is $100, compared with either truck or rail in the region, he said. This cost savings includes all expenses, such as trucking the container between the point of origin and the upriver port, he said.



COLUMBIA River barges carry boxes with other cargo

Although the Columbia for decades has been a major artery, primarily for grain and forest products downstream and fertilizers and petroleum products upstream, intermodal barging did not begin until 1975 when completion of new dams on the Snake River opened slackwater navigation to Lewiston ID — 357 miles from Portland.

Pasco First Upriver

Working with the Port of Portland (particularly D'Amico, who envisioned the container-barging potential), upriver ports and towboat firms began getting into the container-movement business.

The Port of Pasco, at the confluence of the Columbia and Snake rivers, was the first upriver port to get into the act. That port was followed by the Port of Lewiston. Two other ports — the Port of Umatilla and the Port of Whitman County at Wilma WA, just across the state line from Idaho — now are participating in container-barge movements.

In addition, the Port of Clarkston in Washington, also near Lewiston, is planning to install a container crane. Two other ports — at Kennewick and Richland, both in Washington — are studying the possibility of building barge slips to handle containers.

Knappton Towboat Co. and Tidewater Barge Lines move most of the container barges between Portland and upriver points.

At the outset, the ports and towboat firms cooperated to put together price packages that were attractive enough to divert many shippers away from their accustomed land modes, primarily trucking.

At this time, a flat rate for the movement of a container (either full or empty) between Pasco and

Portland is $42 one-way for a 20-foot box and $76 one-way for a 40-footer. The respective rates between Lewiston and Portland are $52 and $92.

"Everything is done on a flat-rate basis," D'Amico said. "It would cost the shipper the same to move gold bullion as hay cubes."

There is only one charge in addition to the towboat firm's hauling rate. Upriver ports charge a container-throughput fee. At Pasco, that charge is $45 for a 20-foot container and $65 for a 40-footer. At Lewiston, the respective rates are $35 and $40.

Such economical rates and shipper acceptance of the container-barging concept has greatly benefitted the Port of Portland as well as having produced new business for upriver ports and the towboat firms.

Cargo Diversions

Previously, much of the trucking was done over the Cascade Mountains to the Port of Seattle. Container barging has resulted in the Port of Portland diverting some commodities away from its rival, Seattle, as well as shifting cargoes from down-river, Portland-destined truck and rail carriers.

"Right now, about 25 per cent of all the export containers at Portland come from upriver," D'Amico said. The other 75 per cent of the container traffic originates in the Portland area and in the Midwest.

Container barging on the river has been a vital factor in Portland remaining a major ocean-carrier gateway, D'Amico said. He noted that ocean carriers, faced with soaring fuel costs, are limiting port calls where there is insufficient container volume to warrant direct calls.

Ninety per cent of the full-container movements on the Columbia-Snake system are downstream, D'Amico said. Large volumes of containerized agricultural products, paper products and animal hides move downstream for exportation to the Far East, primarily.

Many of the containers on the Columbia carry such low-cost commodities as beet pulp pellets, compressed alfalfa cubes and even wheat. The total inland-water movement of containers is priced so attractively that many commodities previously moving in dry-bulk or breakbulk forms have been boxed on a cost-effective basis, D'Amico said.

Upstream containerized cargoes consist primarily of high-value goods, such as wine, glass and machinery. Wine from Europe has been trucked as far inland as western Montana from the Port of Lewiston.

Portland Expansion

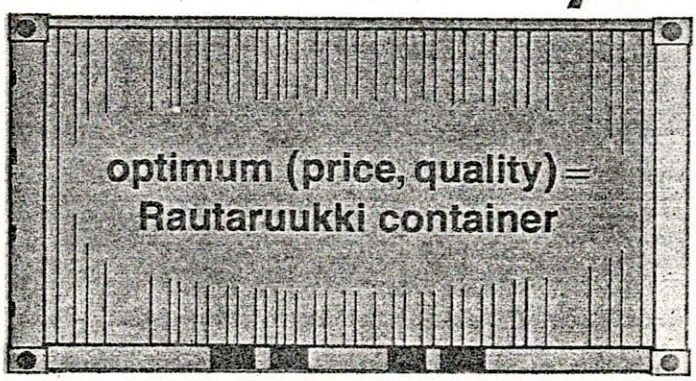
Besides being economical, container barging has been made efficient at the downstream end with modern facilities developed by the Port of Portland.

The initial phase of John M. Fulton Terminal 6 was built in 1974 in the Port of Portland's 3,000-acre Rivergate Industrial District.

The terminal was originally constructed with 1,800 feet of wharf

Continued on page 117

A basic formula for container buyers:



When you choose a steel container made by Rautaruukki you can count on getting a high-quality product to last. New production plant, modern manufacturing methods, base material – steel – that is originally produced and upgraded at the company's own plants, intensive stage-to-stage production control, all these combine to guarantee the high quality and competitive price our containers.

Rautaruukki offers the following types of containers:
- dry boxes
- open tops
- bulkers
- reefers

Rautaruukki containers are made under licence from York Trailer Company Ltd. They are built according to ISO standards and the purchasers' individual requirements. Rautaruukki containers are fully tested and certified.

For detailed information, write or call us.

RAUTARUUKKI OY

Finnish Steel Company
Fredrikinkatu 51 – 53 B, SF-00100 Helsinki 10, Finland
Phone: 358-0-601 911, Telex: 124887 steel sf

Manufacture:
Oulu Works, Piuhatie 21, SF-90600 Oulu 60, Finland
Phone: 358-81-381 144, Telex: 32380 steel sf

Circle No. 5 on Reader Service Card

ter trailers, and will offer a service to Eastern bloc countries as well as the Middle East.

Jeuro is also stressing that freight rates ex-Continent are often lower than from the UK ports, and claims big savings can be made even after paying transhipment costs.

Another sign of Jeuro's growth is a move into larger offices in London.

* * *

If a rate war is looming on sea, both in the Atlantic and on the Far East run, an equally bitter conflict seems likely in the air, especially on the North Atlantic.

Seaboard, the all-container operator, is locked in a rate battle with British Airways and Pan American, especially westbound.

One continental airline freight chief stationed at London Heathrow, not directly involved in the struggle, said: "The pallet prices being offered by Pan Am westbound are ridiculous. They will hardly cover the cost of fuel in my opinion."

British Airways and British Caledonian among other European airlines are nervous at the coming prospect. Since the Anglo-U.S. Bermuda 2-a agreement last March, the gates have been thrown further open in the direction of deregulation, and the Europeans are afraid of being swamped by American competition on both the freight and passenger sides.

With Delta, Northwestern and Braniff, having their big domestic hinterlands to draw from on their new routes, and anxious to fill their wide-bodied aircraft with both flesh and freight, the British in particular point to a possible free-for-all such as is now happening in America. It's not lost on the British that United, Pan Am, American and TWA together managed to lose some $268 million in the first quarter of the year. □

Columbia River

Continued from page 13

(for two berths), a 60,000-square-foot container freight station, three 50-ton-capacity Hitachi container cranes and four traveling bridge cranes. The facility has direct rail and highway access and is served by a computerized cargo-inventory system.

Since the terminal was completed, a 200,000-square-foot cargo-distribution center warehouse has been built at Terminal 6, for imports consolidated and shipped to inland U.S. destinations. And a 66-acre foreign-trade zone recently has been established adjacent to the terminal.

In addition, the port is undertaking a major expansion of Terminal 6. The wharf is being extended 1,050 feet, two more container cranes will be added and there will additional paved backup storage space.

D'Amico is projecting conservatively, he says, that the Port of Portland will see a 15-to-20 per cent-per-year growth in container traffic on the river, as agriculture continues to develop in the upriver country — as well as other types of industry develop along the river itself. □

HOW CAN OUR CENTRALIZED CARGO CONTROL SAVE YOU MONEY?

We're one of the few ports with a total cargo control system. We manage our own piers, warehouses, terminal railroad, bulk handling plants, container and RO/RO handling, security, even the harbor itself.

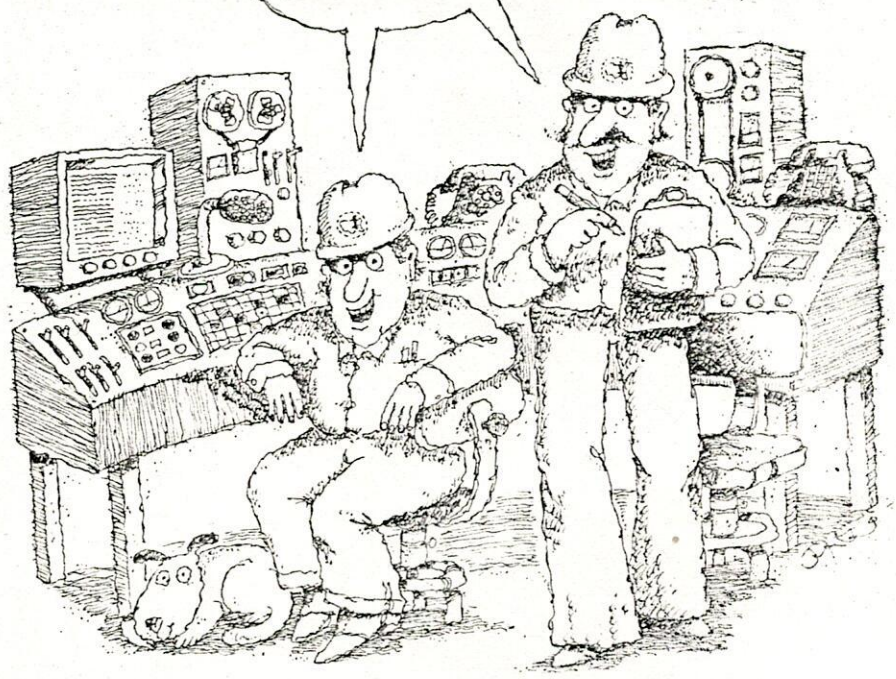
This eliminates confusion on the docks and congestion in the harbor. And it means your cargo moves through faster and more economically.

It also means that just one phone call will get you the answers you need. So ask us. We'll show you how to Mobilize your cargo and minimize the cost.

ASK THE PORT OF MOBILE!

PORT OF MOBILE

Alabama State Docks, Mobile, Alabama 36601, (205) 690-6107, TWX 810 741-7748. New York (212) 947-7040. Birmingham (205) 251-0109. Chicago (312) 922-1694.



Circle No. 48 on Reader Service Card

(Immediates)

J I Case
A Tenneco Company

Drott Division

TENNECO

Box 1087
Wausau, Wisconsin 54401

August 8, 1980

George R. Grove
Executive Director
Port of Astoria
P. O. Box 569
Foot of Portway Street
Astoria, OR 97103

We are containerizing an ever-increasing amount of our export shipments. Certain of our products can be stuffed at origin; some require stuffing and handling at port.

To aid us in our export planning, it is very important that we obtain a detailed listing of container handling facilities at your port. If you have such a listing or directory, please send it to my attention. It would be much preferred if this listing or directory includes names and phone numbers of the various responsible managers.

Please accept our thanks for this service.

Sincerely,

N. R. Brost
Traffic Manager

mkl08078003

DROTT

THE PORT OF ASTORIA

At the entrance to the mighty Columbia River

P. O. BOX 569 ASTORIA, OREGON 97103 PHONE (503)325-4521

COMMISSIONERS
HENRY C. DESLER, PRESIDENT
DAVID D. CORKILL, VICE-PRESIDENT
HOWARD B. JOHNSON, SECRETARY
FRED C. SHAYLOR, TREASURER
CHARLES J. THOMPSON, ASST TREASURER
GEORGE R. GROVE, EXECUTIVE DIRECTOR

August 19, 1980

Mr. N.R. Brost
Traffic Manager
J.I. Case
A Tenneco Company
Box 1087
Wausau, Wisconsin 54401

Dear Mr. Brost:

In response to your correspondence of August 8, 1980, the Port of Astoria does not have the capability of handling containers at present.

Sincerely,

George R. Grove

George R. Grove
Executive Director

GRG:sd

Geo
Haney
(F)

ITEL

Container Division
4th & Battery Bldg., Suite 801
Seattle, Washington 98121
(206) 624-7644
Telex 32-9660

November 3, 1980

Mr. Roger Shannon
Deputy Director
Port of Astoria
Municipal Dock
Astoria, Oregon 97103

Dear Roger:

Thank you very much for the opportunity to meet with you last week and discuss Port of Astoria development. The Port's plans for a container terminal and related facilities were interesting to note and definitely appear feasible. Astoria's proximity to ocean shipping lanes and existing deep water sites certainly contribute to future development.

As we discussed, ITEL Container would be very interested in assisting any potential steamship accounts that may call the Port of Astoria by supplying their equipment needs. Also, if we can assist the Port with any questions regarding container equipment, please feel free to contact our office. I have enclosed a brief ITEL pamphlet for your perusal.

Roger, thanks again for your assistance.

Best regards,

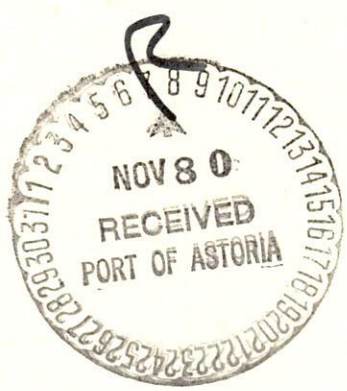
ITEL CONTAINER DIVISION

Erik H. Kirby

Erik H. Kirby
Marketing Representative

cc: Linda Martin/ITEL-Seattle
Tom Veronneau/ITEL-San Francisco

EHK:th



SWAN WOOSTER
ENGINEERING INC.

SUITE 950, LLOYD FIVE HUNDRED BUILDING, 500 N.E. MULTNOMAH, PORTLAND, OREGON 97232, TELEPHONE (503) 238-7050

November 10, 1980

P1.19

Mr. George R. Grove
Executive Director
Port of Astoria
P. O. Box 569
Astoria, Oregon 97103

Subject: Ocean Mining of Manganese

Dear George:

During our telephone conversation on November 3, 1980 we discussed the ocean mining of manganese. You may recall we also discussed this subject over lunch one day last August. I think we agree it is an interesting long-range possibility for development.

As promised, I am attaching several pages from the October issue of Port Stockton's Soundings. It is one of the better papers I've seen on the subject. If you and your potential developer come to the point of needing conceptual planning for such a facility at Astoria, we would like to be considered for the assignment.

Yours very truly,

SWAN WOOSTER ENGINEERING, INC.

Wayne J. Mitchell, P.E.
Director of Development

WJM/cl
Attachment

Ocean Mining:

The Ships And Ports

By Conrad G. Welling

As described in a previous article, the mining ship that will recover mineral nodules from the ocean floor will be as large as a supertanker. The mining ship will stay at its mid-ocean post for approximately five years at a time since it is not economical for the mining ship to shuttle back and forth to port. To use the mining ship as a cargo vessel would be inefficient. Other ships will be used for carrying the ore to port and to supply the mining ship with consumables and services: and for the most part, specially designed ships will be required as well as special port facilities. The cargo ships and the port facilities must all be designed as a complete system, to be able to work along with the mining ship and its equipment.

The environment is very much a part of this system. The fundamental environmental research being carried out by *Ocean Minerals Company* is providing important information for the design of the system. Analysis to date gives us assurance that we can minimize environmental disturbances and conserve the ocean resources. Knowledge of the natural processes of the ocean is enabling us to design an ocean mining system that fits in with the natural systems so that the normal ocean processes will do some of the work with minimal impact.

That word "system" is not just a word. Economic, marketing, political, as well as engineering and environmental analyses are involved, and as with any large-scale engineering and business venture, cost trade-offs must be considered along with technical goals. When the mining ship begins operating, the complete system must be in place. During the start up period, (as long as a year or more), innovation will hopefully make up for problems encountered, for downtime is costly and must be held to a minimum. Facilities for handling and treating the ore must be ready at destination. Because transportation costs are so important in any mining venture, ore-carrying distances must be kept reasonably short, and the handling of the ore kept to a minimum.

Dynamic Station Keeping

Ore will have to be transferred from the mining ship to the carrying ships at sea, under all kinds of weather and sea conditions, except those associated with hurricanes. One of the major challenges in the total ocean mining system will be dynamic station keeping — the ability of two ships to move together in harmony in most of the expected weather conditions.

Dynamic station keeping in itself is nothing new. For example, smaller ships such as offshore oil drilling vessels use it, but we are talking about ships five to ten times or more as large. While transferring cargo and fuel at sea has been accomplished dating back to World War II, we are talking about much larger loads in equally short times. Hopefully, the mining ship will be able to offload and load in no more than one day. The mining operation will require ore and cargo transfer under a wide range of wind and sea conditions — wider than the range usually associated with mid-ocean refueling. Both the mining ship and the bulk carriers will have to be equipped, and their crews carefully trained for this exacting operation.

In dynamic station keeping, all of a ship's movements are under constant control. Side-thrusting propellers at bow and stern constantly churn, to keep the ship in the same place relative to the ocean bottom, and keep it oriented in a desired direction. The ship is continuously countering the action of winds, waves, and currents, and the forces acting on them are tremendous. For two ships to keep on-station together, both must have this fine control, and both must move with precise coordination For an ore-transfer operation, the two ships would have to keep their positions relative to each other to within a few feet.

One approach is to design the mining ship with sufficient station-keeping ability to serve the ore-cargo ship as well as itself, docking the cargo ship to the mining ship with giant pneumatic bumpers to prevent ship damage. Station-keeping is an aspect of the total system that requires detailed design and testing.

The bulk cargo ships involved would be very large. They may be 800 or more feet long, with a beam of 150 feet which puts them in the class of today's larger tankers. Ores are bulk cargoes, and ocean nodule ore is bulkier than most, but not very dense. They are porous, and up to 30 percent of the weight of the nodule is water held in microscopic pores. About 50 percent of the cargo of the ore-carrier will probably be sea water, thus we have a low-density, low-value cargo. The only way to make hauling that cargo economical is a large ship.

Use Of Slurry

The nodules will be pumped up from the bottom-crawling mining machine to the mining ship in a watery slurry. For transfer to a bulk cargo vessel they must again be pumped in a water slurry, and off-loading of the cargo vessel in port is likely to involve a slurry again. Thus, the decanting of water will be a problem at one or more stages of ore handling. To be economical, the water-to-ore ratio must be kept as low as possible. But again this will involve economic and engineering trade-offs: the "ideal" system from the point of view of one may not be ideal from the point of view of the other.

Of course, use will be made of any technology already developed. We are looking at the techniques already in use for handling certain iron ores in slurries.

Use of a slurry generates a problem with fines; fines are what their name suggests, extremely small particles that break off from the nodules as they are handled. They tend to remain suspended in water. Valuable minerals would be lost if the discarded water held too many fines, and there also could be pollution problems, when the water and fines are discarded at a processing plant or in port. In our present experiments we are endeavoring to hold the fines down to 10 percent or less. We are also looking at alternatives for slurry storage in port — for example, "drip-dry" piles versus storage in decanting ponds.

Either the piles or the ponds would take up room; therefore, large acreage near the port would be required. The transport ships, too, will have to be equipped to re-slurry the ore without generating exces-

sive fines, and to deal with such fines as occurred. Before we begin operations, all the alternatives will have been tested, and the optimum ways found – optimum from the environmental, economic and engineering points of view, with reasonable trade-offs.

Carefully Designed Supply System

Conventional ships may be used for some purposes, such as carrying fuel and supplies to the mining ship. However, in the design of the system we have to consider the possibility of mixed cargoes and mixed capabilities. It is not economical to deadhead ships – to let them sail empty on the outward or return leg of a voyage. It may be necessary for outgoing bulk carriers to carry fuel to the mining ship, or for such a ship to pick up reagents, from some port on its way either to the mining ship or to the processing port. Certain reagents used in metals processing may have to be carried in special ships that carry little or nothing else. These, too, will have to be designed as part of a system.

Heavy spare machinery could be carried to the mining ship in the bulk carriers. For some needs – spare parts, special supplied, medical emergencies – small, fast ships or air drops may be required. There is plenty here to challenge the engineer, the marine architect, the economist, and even the port captain. The more of the requirements that one considers, the more evident the need becomes for a carefully designed overall system.

Disposal Of Waste Material

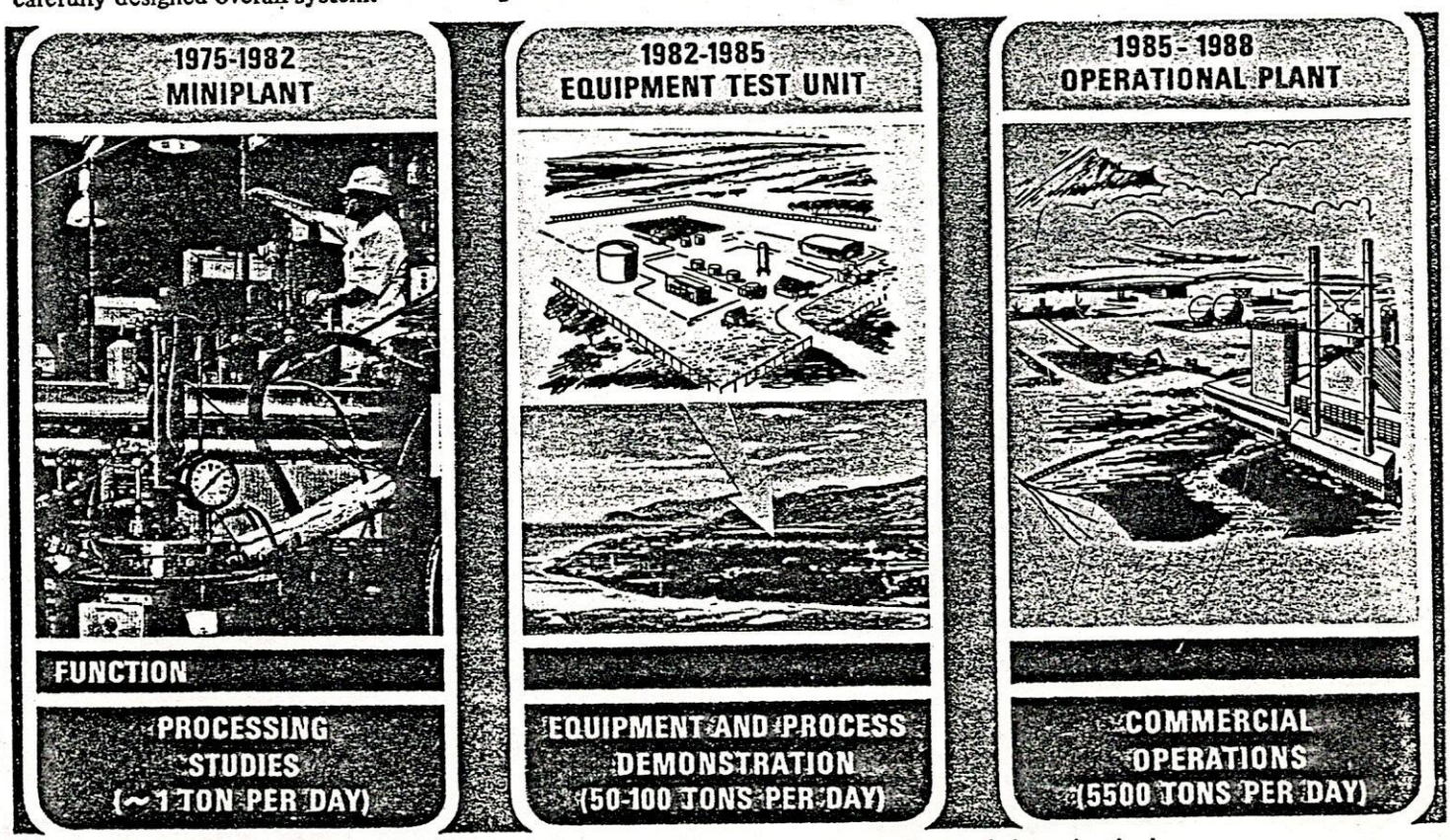
One problem being studied in the design of the overall ocean mining system is the disposal of tailings – the waste material left over once the desired metals have been removed from the ore. Our research indicates that the environmentally optimum – as well as most economical means may be disposal at sea and most of what would be returned to the sea would be manganese.

As mentioned in previous articles, the target metals are nickel, copper, and cobalt. Although manganese is richly available in the nodules, its market is limited. However, steel cannot be produced without it; therefore, it has high strategic importance. Though one particular local smelting operation might remove all the manganese, overall, the future ocean mining industry would only remove a small percentage of it. It is estimated that about 95 percent of all the manganese in the ecosphere is on the ocean bottom; it is apparently brought to the ocean by rivers and runoff from the land. In the ocean, it is taken up by various life-forms, mostly very small, which do not concentrate it in their bodies. They drop the manganese in fecal pellets, which settle to the bottom and thus begin the process of disposition of manganese and other metals into nodules.

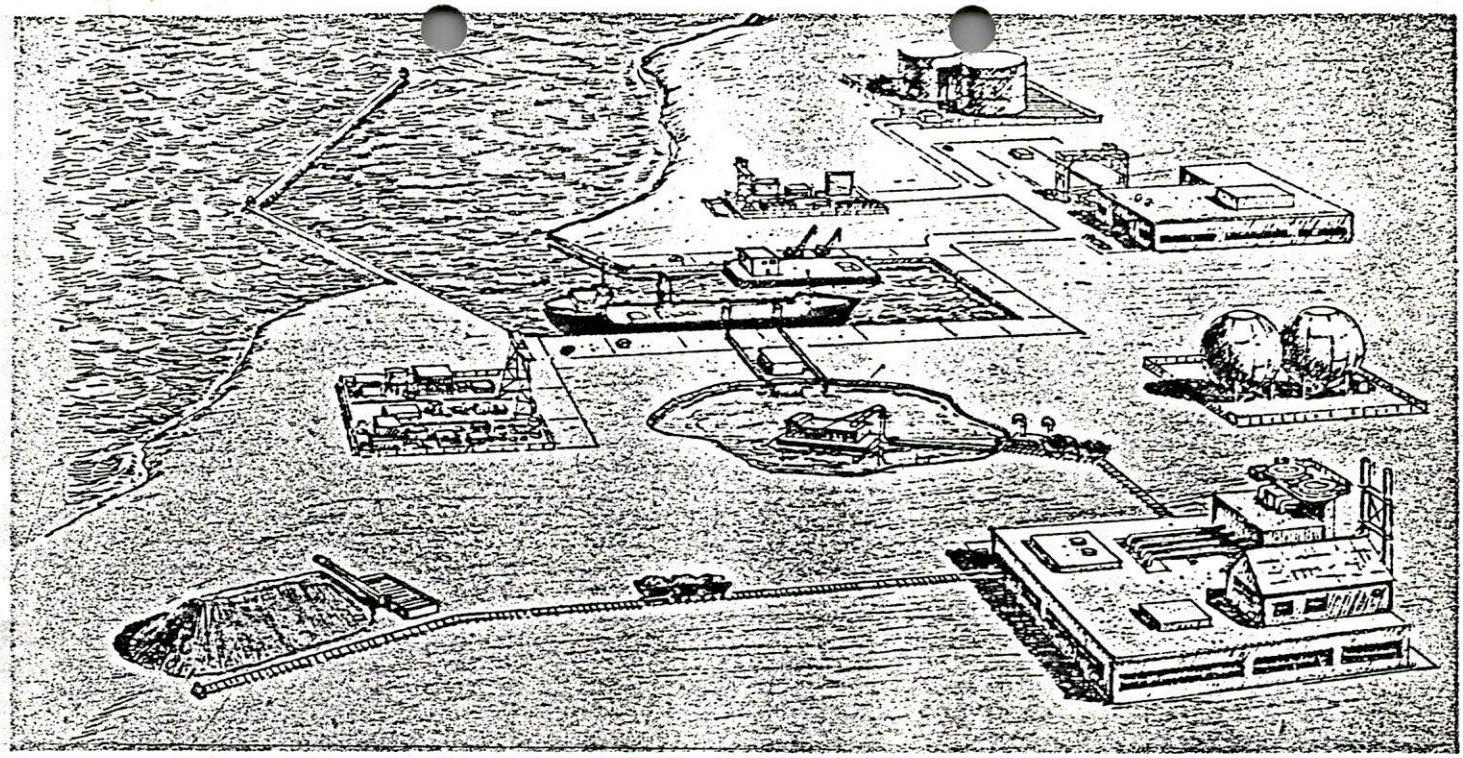
If we dispose of the "leftover" manganese at sea, we shall be doing only what nature is doing. Some people have suggested that we store the tailings on land so as to avoid polluting the ocean with "excess" manganese and as a conservation measure. Piles of tailings on land, however, could themselves cause a pollution problem – besides taking up valuable room. By disposing of the manganese at sea, we permit it to be recycled by natural means. Even the largest mining operation we can imagine would involve at any one time a microscopic percentage of the manganese already in the ocean and on its floor.

Some of our tests have involved free-drifting "traps" set at various depths in the ocean down to 1,000 meters (about 3,300 feet). These measure both the quantity and the composition of the constant fall of particle material – any kind of material – from the surface to the bottom. A set of traps was left drifting for a month and then collected and its contents analyzed. Our tests were the first ever made in the deep Pacific nodule area, though similar tests had been done in shallower, inshore waters.

The "trap tests" indicate that the tailings should settle to the bottom very quickly, dispersing as they go. Tests on where a downward "plume" of tailings goes are being conducted. Plumes settle and disappear so quickly that, in one government-operated test, scientists had to use sensitive chemical instruments to keep track of where the plume was going. The discharge from a moving ship – or a stationary one, given the ocean's system of currents – apparently disperses and



Development of a full-scale ocean mining capability will occur in steps to preclude costly mistakes.



New port facilities will be required to handle the enormous amount of nodule tonnage.

settles rather quickly with little or no adverse effect on the environment.

Location Of Ports

Port siting is another essential design consideration. Because of the size of the bulk cargo ships involved, large deep-draft harbors will usually be needed. In some cases, a ship may be able to anchor or maintain station in the roadstead, and offload slurry through a pipeline, without having to enter a harbor. This would be possible wherever wind and sea conditions are favorable (such as Hawaii). For a particular port, one of the economic trade-offs to be considered might be deepening the harbor versus accepting the added cost of using smaller ships.

Obviously, port siting cannot be at random. For operations in the Pacific, the most logical sites are at Hawaii, and the U.S. West Coast, since these are within 2,000 miles of the mining sites currently contemplated, and not too far from North American markets for the metals. Other ports might be in Japan: though the distance is longer, Japan has a market for metals and, of course, eventually ore fields west of Hawaii may be mined.

A Mining System For This Decade

How important to the shipping world will marine-nodule bulk cargoes be in the future? They will always involve a "small" percentage of the total bulk cargo capacity of the world's shipping. Coal is going to keep growing in use and importance, and will always overshadow the ocean mineral ore transport. In the next century as many as fifty ocean mining systems may be sending 175 million tons of ore an average distance of 1,600 miles per annum, but coal transport is already surpassing 150 million tons per annum, going an average of 4,700 miles. However, 175 million tons is a respectable tonnage, and the ship bottoms to carry it will represent a significant amount of shipbuilding and shipping operations.

One nominal ocean mining system, producing 5,000 tons of nodule ore a day, will involve several million tons a year of slurry, 500,000 tons per year of reagents (mostly used onshore), 250,000 tons of hydrocarbons (fuel oil, coal, lube oil), 10,000 tons per year of supplies and consumables, plus maintenance and repair equipment and materials. It is technically possible to have such a system operating by the late 1980's, growing to a fleet of systems in the next century. That growth itself will have to be systematically planned.

According to legislation recently passed by Congress, which both Industry and Labor have supported, each mining operation must employ at least one cargo ship under U.S. registry, and the mining vessel will also be under the U.S. flag. The rest of the bulk transport fleet may be foreign (especially as some foreign governments, notably Japan, might subsidize the shipping to their own ports). The law does not require that the ships be built in U.S. shipyards, but does provide that such shipbuilding done in U.S. shipyards could be protected under Title XI of the federal mortgage guarantee laws, as well as receiving differential building and operating subsidies. The ships would most likely be built here assuming the U.S. shipyards can meet the technical specifications.

Competitive With Land-based Sources

In any case, current economic analysis shows that ocean mining will be competitive with future land-based ore sources. As mentioned in the first article in this series, the price of critical metals such as nickel keeps rising; meanwhile, land-based ores are becoming progressively poorer as compared with manganese nodules. The costs of land-based mines have been rising at an alarming rate due mainly to the cost of the infrastructure – that is the supporting ports, roads, towns, power plants, etc. – needed to be built in remote, often difficult regions of the world. Ocean mining requires a lesser investment in the infrastructure since the critical factors, mining and transport, involve large, economical ships to transport the ore to more favorable areas with some or most of the infrastructure already established.

Ocean mining appears to have no insurmountable technical or environmental obstacles, and under the right conditions, can attract the necessary investment capital. The major obstacles are political and legal. The principal uncertainty is how the Law of the Sea Conference will finally resolve its deliberations, and it is that uncertainty that holds back ocean mining development. Investors need a reliable set of legal ground rules. Hopefully, the Law of the Sea Conference can be concluded favorably "one way or the other," at an early date. □

PORT OF ASTORIA

INTER-OFFICE COMMUNICATION

TO FILE DATE DECEMBER 15, 1980

FROM EVELYN BREDLEAU

SUBJECT

Per Roger's request, I checked on related shipping costs with various trucking companies in Oregon and Washington for Mr. Galbraith, company unknown, for shipping steel from Astoria to Portland and Astoria to Seattle.

Rates were given to Mr. Galbraith on 11/26. No further information available.

Japan

Galbraith

7-10 thous tons 206 763-8644

Wendy

Steel Rates per 100 lbs.

	INITIALS	DATE
PREPARED BY		
CHECKED BY		

FORM P-512 (GREEN) P-512-B (BUFF) — Bet-Rite SYSTEMS CELINA, O. · ELMWOOD PARK, N.J. · GREENSBORO, N.C. · DALLAS · TULARE, CALIF. — LITHO IN U.S.A.

LINE No.		1000 lbs	(1) Dudley Trucking 241-0089		(2) Ferry Porter	(3)	(4) Oregon Transfer 289-1375	(5) Bellevue	(6)	(7) Interstate 256-3355	(8)	(9)	(10) Green Transfer 286-6673	(11) Morgan - Hoffman	(12)	LINE No.
1	Cost - ~~Std~~	~~46~~	20	63			~~166~~						166			1
2		24	30	55			125						125			2
3		32	40	45			94	Can't					94			3
4		40	48	41			81						81			4
5		48					74						74			5
6																6
7	Fuel Surcharge						6%						6%			7
8	off dock		13%										13%			8
9																9
10																10
11																11
12																12
13																13
14																14
15																15
16	Cost - Seattle	14	20-	115									368			16
17		~~24~~	30-	99									259			17
18		32	~~40~~	82									200			18
19		40	48	.74									171			19
20		48											—			20
21																21
22	Surcharge		13%										13%			22
23																23
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25																25
26	Mech. Mile															26
27																27
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